

**2018 IMAG Futures Meeting – Moving Forward with the MSM Consortium (March 21-22, 2018)**

*Pre-Meeting Abstract Submission Form*

\*Please submit to the NIBIB IMAG mailbox ([NIBIBimag@mail.nih.gov](mailto:NIBIBimag@mail.nih.gov)) by **January 8<sup>th</sup>, 2018**

\*Save your abstract as “MSM PI Last Name \_ 2018 IMAG Futures Pre-Meeting Abstract”

**PI(s) of MSM U01: Diamond, SL**

**Institution(s): University of Pennsylvania, Johns Hopkins**

**MSM U01 Grant Number: U01-HL131053**

**Title of Grant: Multiscale Systems Analysis of Trauma**

**Abstract**

**Which MSM challenges are you addressing from the IMAG 2009 Report and how?**

<https://www.imagwiki.nibib.nih.gov/content/2009-imag-futures-report-challenges>

(indicate which challenge (#) you’re addressing)

#1) Next-generation multiscale models that integrate between different scientific fields:

→ Cardiovascular hemodynamics, immunology, and hematology

#9) Model predictions that drive experimentalists towards systematic testing and validation

→ Prediction of clotting and platelet function testable in microfluidic/well plate or TEG assay

**Are you using machine learning and or causal inference methods and how?**

High dimensional calcium phenotyping of cellular response used to train neural network model of platelet signaling. Using patient-specific platelets for machine learning.

**Please briefly describe significant MSM achievements made (or expected).**

Discovered fundamental new mechanism of platelet downregulation during trauma through high throughput analysis of platelet signaling: Lee MY, Verni CC, Herbig BA, Diamond SL. Soluble fibrin causes an acquired platelet glycoprotein VI signaling defect: implications for coagulopathy. **J Thromb Haemost.** 2017 Oct 5. doi: 10.1111/jth.13863. PMID: 28981200

Discovered fundamental new mechanobiology of shear induced NETosis: Yu X, Tan J, Diamond SL. Hemodynamic force triggers rapid NETosis within sterile thrombotic occlusions. **J. Thromb. Haemost.** 2018 (in press).

Please suggest any new MSM challenges that should be addressed by the MSM Consortium moving forward.

Strategies for experimental data generation and experimental design that are specifically generated for model development and validation.

Improved annotation, data structures, and data capture for complex, multi-clinician medical interventions such as surgery, resuscitation therapy, anesthesiology.

What expertise are on your team (e.g. engineering, math, statistics, computer science, clinical, industry) and who?

*High throughput biology, microfluidics, blood reaction kinetic modeling – Diamond SL.*

*Machine learning, Data mining, Equation free modeling – Kevrikidis Y.*

*Numerical methods, Multiscale modeling, Stochastic simulation -- Sinno T.*

*Trauma Surgery, Patient Medical Informatics, Metabolism – Sims C.*

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